The GOES-R GLM Lightning Jump Algorithm (LJA): Research to Operational Algorithm

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- Prior R3 (Schultz et al. 2009 MWR, Gatlin and Goodman 2010 JTECH, Schultz et al. 2011 WF) explored the feasibility of thunderstorm cell-oriented lightning-trending or "jump" algorithms for application to operational severe weather warning decision support

- Objective - To refine, adapt and demonstrate the LJA for transition to GOES-R algorithm readiness and to establish a path to operations

- Year 1 Plans – reducing risk in algorithm automation, cell tracking, GLM proxy and data fusion. Demonstrating in PG.

- **Develop LJA as an automated objective system for operations**
  (Schultz, Carey, Petersen, Goodman)
  - Fully automate and optimize LJA (rules, thresholds) to *GLM proxy* and multi-sensor *object tracking* improvements
  - Objective environmental definition and modification of LJA to improve performance skill scores and mitigate known LJA biases with low topped convection (cool season, tropical)
  - Explore fusion of LJA with radar and multi-sensor GOES-R (ABI) products

- **Improve cell (object)-oriented tracking**
  (Cecil, Lakshmanan, Schultz, Carey)
  - Optimize current WDSS-II/K-means cell tracking algorithm to reduce tracking ambiguity for LJA
  - Multi-sensor (GLM proxy, ABI proxy, radar), multi-parameter (e.g. GLM flash initiation density, flash [or group, event] extent density) object tracking

- **Refine and develop large GLM "Level II" proxy database for R3**
 *(Bateman, Stano, Carey)*
  - Must use representative proxy lightning (e.g., GLM resolution, 8 km)
  - GLM is new GOES-R instrument – legacy LIS is LEO so no flash trends
  - Use statistical-physical methods to transform VHF-based LMA (possibly LF/VLF) to optical lightning proxy using LIS as the "Rosetta Stone".
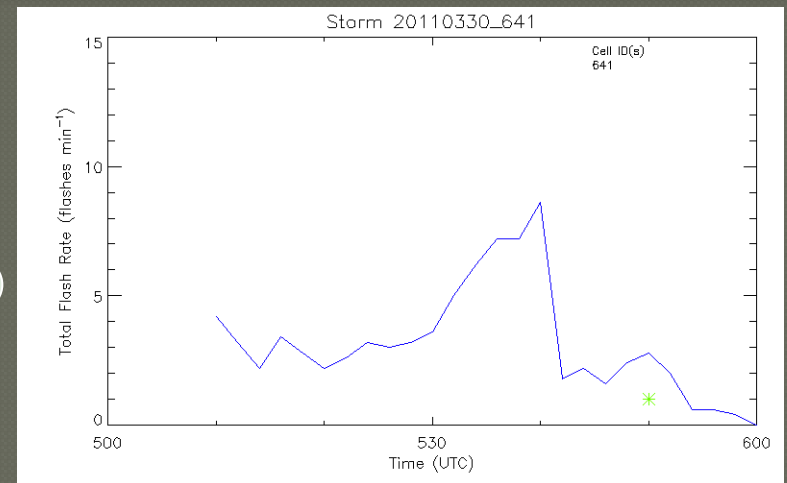
- **Demonstrate automated LJA algorithm in NOAA Proving Ground**
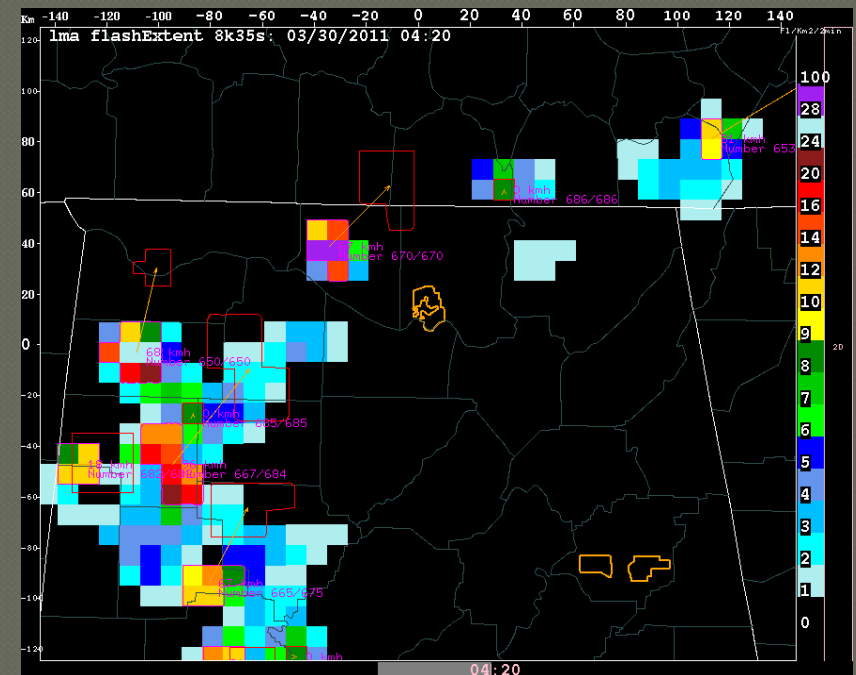 *(Carey, Stano, Schultz)*
  - Active participation in National Lightning Jump Field Test coordinated by NOAA NWS (planning already underway for Spring 2012)

Flash rate, lighting jump prior to severe
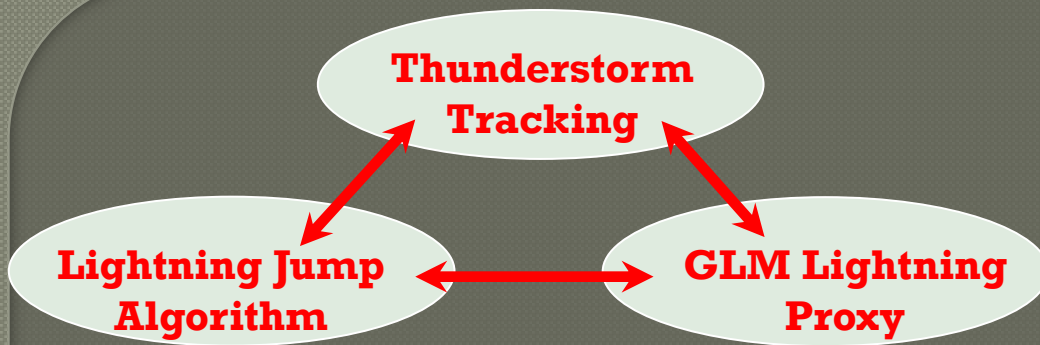
- The LJA is a 3-pronged system

- Tracking on GLM flash proxy
  - Little legacy research
  - Will be useful for tracking with combinations of data types (ABI, radar) and in radar denied areas.

- Representative GLM flash proxies are critical for development and testing of LJA

- LJA requires optimization to the details of tracking on GLM proxy (or multi-parameter, multi-sensor fields)

8 km x 8 km LMA Flash Extent
Density and lightning "cell" tracks